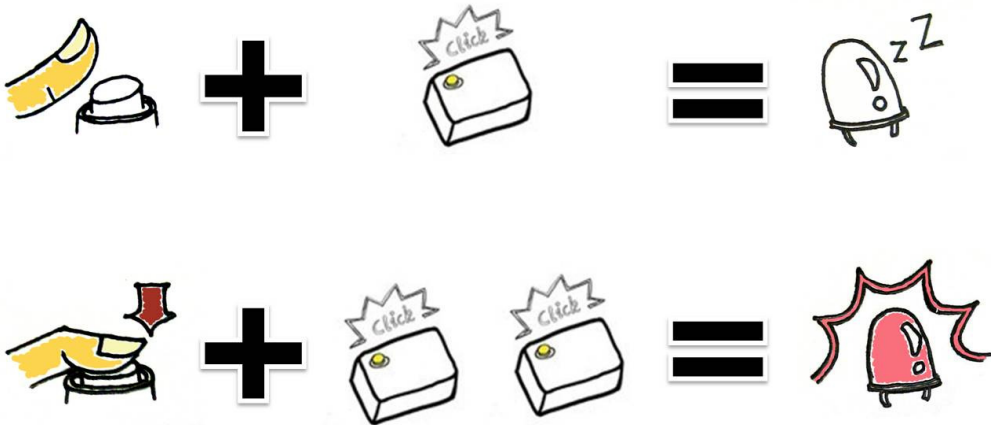# MilCandy

Introducing MilCandy

MilCandy is an easy-to-use controller. It gives you plug and play flexibility without the need for programming. It works with most GROVE modules, so there are lots of input and output options for you to design exciting projects.

We've drawn up several examples in this applications guide to jumpstart your creative juices. First up, we've outlined a straightforward light control demo using a button for input and an LED as output. The diagram below shows you how to set the logic.

INPUT: Grove – Button

OUTPUT: Grove – LED

In our first example above, do not press the input button and single click the yellow "set" button on MilCandy to tell the LED not to turn on.

In the second example, hold down the button while double clicking the yellow "set" button. This will tell the LED to turn on when the button is pressed.

Below is an image of the assembled project. The LED output is on the right and the button input is on the left.
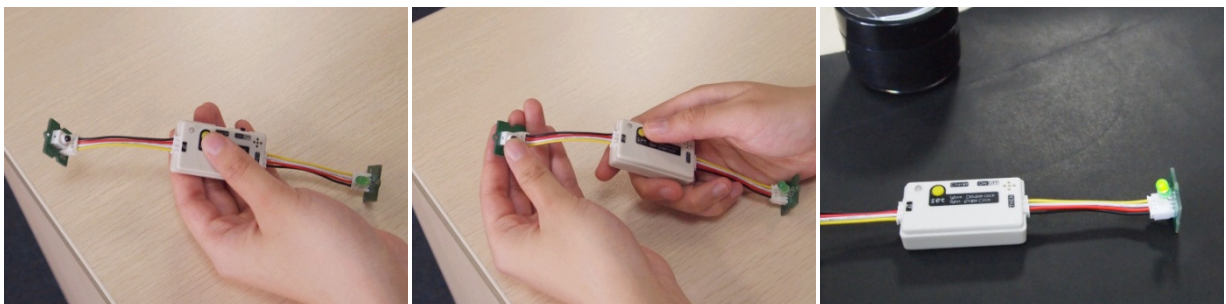
Once you master the LED example above, you can utilize other Grove modules in the same manner and play with different inputs or outputs. With a little imagination, you can create interesting mini-projects or make daily life more convenient.
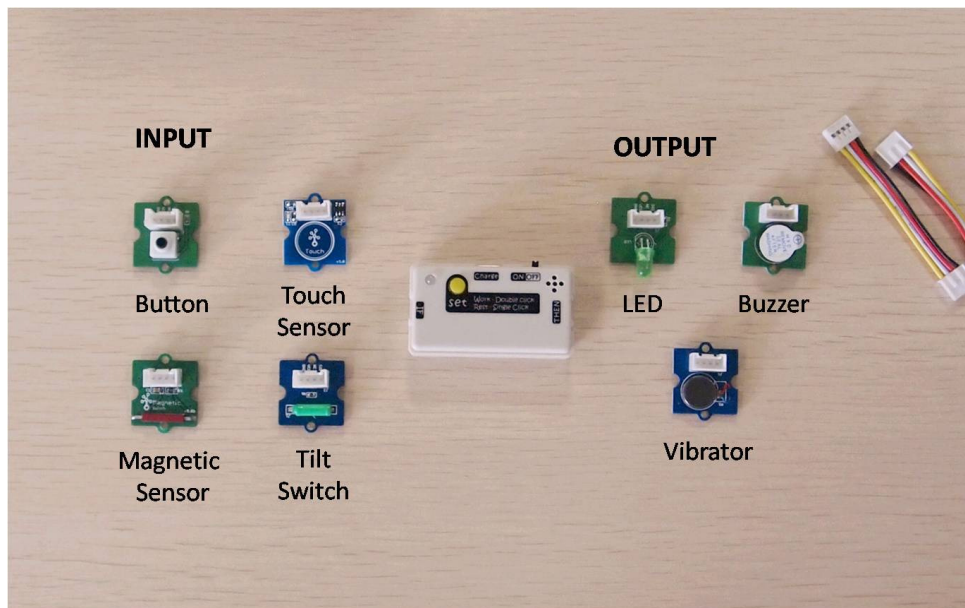
We came up with some fun projects using digital sensors, analog sensors, and a relay switch and fleshed them out below. Pick and choose what tickles your fancy or try them all out. We love to hear from you, so please feel free to leave comments on the MilCandy product page.

1、 Intruder Alarm

Wish you had a butler to protect your privacy? Try this quick solution, a do-it-yourself intruder alarm. It notifies you when your door is opened.

INPUT: Grove - Magnetic Sensor

OUTPUT: Grove - Buzzer
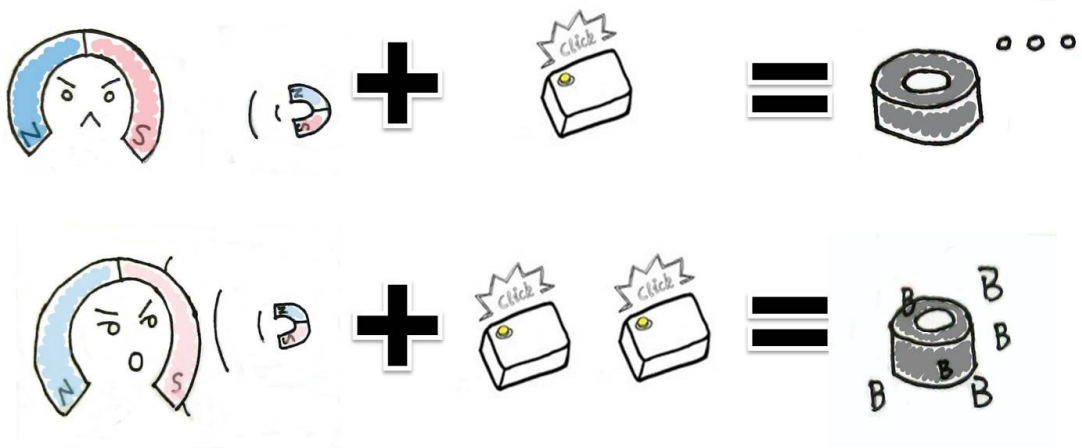
In this scenario, the magnetic sensor, MilCandy, and buzzer are assembled and attached to a door. A magnet is placed on the wall which the door opens into.

When the door is closed, click the yellow "set" button on MilCandy to tell the buzzer to remain silent.

When the door is open and is near the magnet on the wall, double click the yellow "set" button. This will activate the buzzer.

If you want to make the buzzer louder, remove the sticker from it.

In picture below on the left, the magnetic sensor, the MilCandy, and the buzzer are attached to the door. In the picture on the right, the door is opened and the magnetic sensor comes in close proximity to the magnet on the wall, and the buzzer beeps loudly.
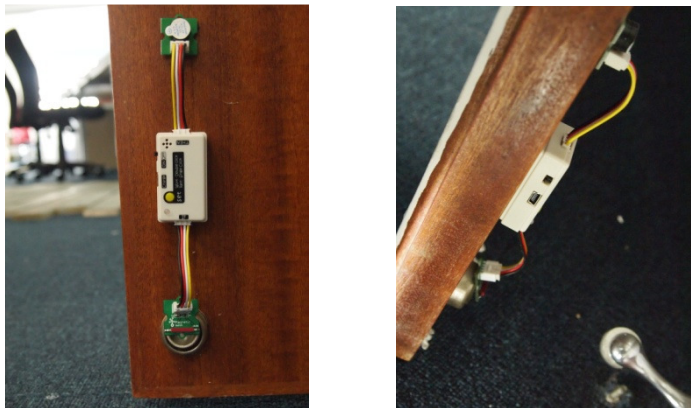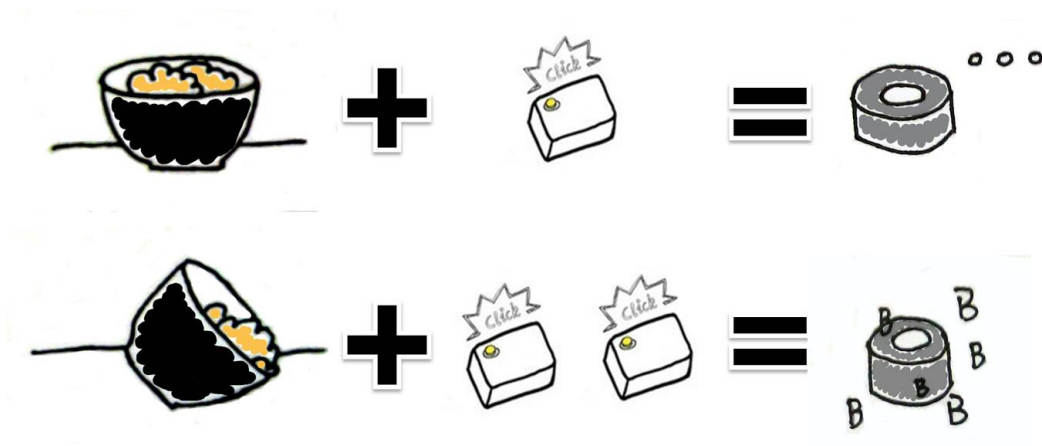

2、 Tilt Sensor

If you have small children, you'll want to recreate this example. We utilize a tilt switch to notify you when your food bowl is unstable. The tilt switch can sense the imbalance and the Buzzer or LED on the output end will give you a warning with a loud beep or light.

INPUT: Grove - Tilt Switch

OUTPUT: Grove – Buzzer or LED

When the bowl is balanced, click the yellow "set" button on MilCandy to tell the buzzer to remain silent.

When the bowl is titled, double click the yellow "set" button. This will activate the buzzer.

In practice, you can utilize a rivet to join the tilt switch and buzzer back-to-back. So the end result will be more compact as in the pictures below.
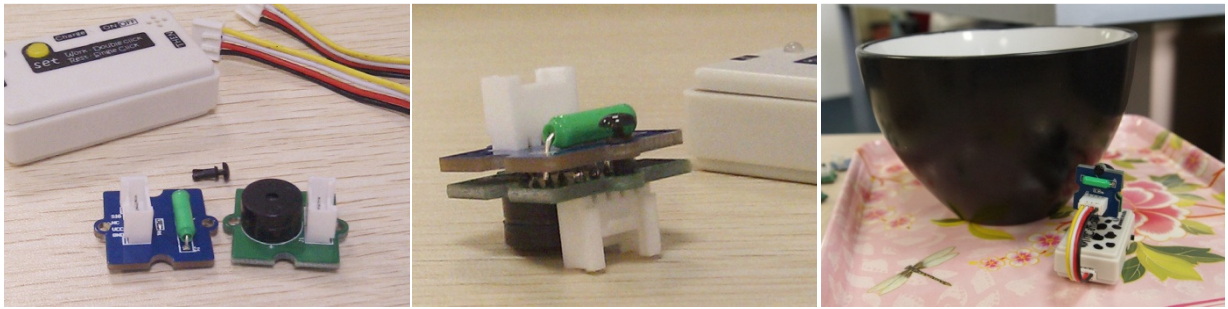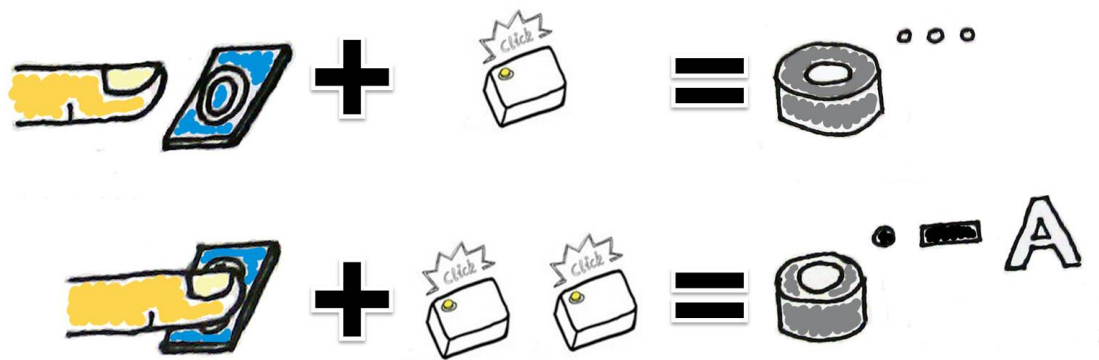

3、   Morse Code
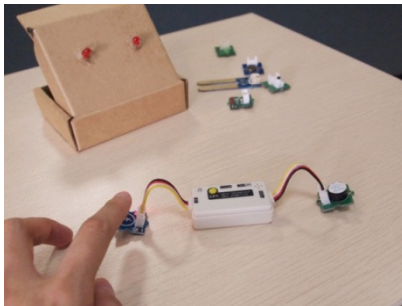
Touch sensors are generally used on interactive projects. Here we've paired it with MilCandy to create a mini communication tool. You can construct your own Morse Code transmitter and learn an old school messaging system.

INPUT: Grove – Touch Sensor

OUTPUT: Grove – Buzzer

In our first example above, do not press the touch sensor and single click the yellow "set" button on MilCandy to tell the buzzer to remain silent.

In the second example, hold down the touch sensor while double clicking the yellow "set" button. This will activate the buzzer.

Now you are all set and ready to transmit. Touch the sensor, as you would a Morse Code armature, and tap out your message. For example, for the letter A you would use a short tap and a long tap, and the buzzer would respond with a short beep and a long beep. For your reference, an International Morse Code chart is provided below, obtained via Google search.

International Morse Code

1. A dash is equal to three dots.
2. The space between parts of the same letter is equal to one dot.
3. The space between two letters is equal to three dots.
4. The space between two words is equal to seven dots.

|			
A ● ▬		U ● ● ▬	
B ▬ ● ● ●		V ● ● ● ▬	
C ▬ ● ▬ ●		W ● ▬ ▬	
D ▬ ● ●		X ▬ ● ● ▬	
E ●		Y ▬ ● ▬ ▬	
F ● ● ▬ ●		Z ▬ ▬ ● ●	
G ▬ ▬ ●			
H ● ● ● ●			
I ● ●			
J ● ▬ ▬ ▬			
K ▬ ● ▬		1 ● ▬ ▬ ▬ ▬	
L ● ▬ ● ●		2 ● ● ▬ ▬ ▬	
M ▬ ▬		3 ● ● ● ▬ ▬	
N ▬ ●		4 ● ● ● ● ▬	
O ▬ ▬ ▬		5 ● ● ● ● ●	
P ● ▬ ▬ ●		6 ▬ ● ● ● ●	
Q ▬ ▬ ● ▬		7 ▬ ▬ ● ● ●	
R ● ▬ ●		8 ▬ ▬ ▬ ● ●	
S ● ● ●		9 ▬ ▬ ▬ ▬ ●	
T ▬		0 ▬ ▬ ▬ ▬ ▬	

Analog Sensors

What happens if a Rotary Angle Sensor (RAS) is substituted for the button in our light control example? Unlike the button, RAS isn't simply "ON" or "OFF". RAS inputs are based on rotation angles, which are various and continuous. So you need to understand "set point" before incorporating it.

Let's say the input of RAS gets divided into a range from 0 to 1. If we click and double click as indicated in the image below, the LED would only turn on when you tweaked it to 1.
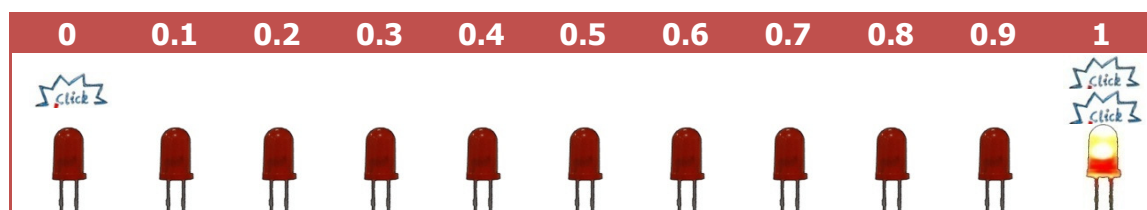

In most situations, that won't be sufficient. What you need might be dependent upon the rise and fall of the angle to a critical level. That critical level is the "set point". You have to know the set point and double click MilCandy at that moment to store it. In the drawing below the "set point" was set to 0.5. Now the LED will light up when the threshold is reached or exceeded.
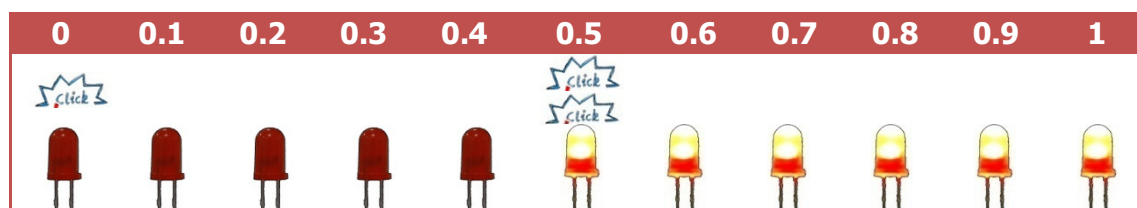
Such continuous input is called analog input, and it pertains to temperature, humidity, light, and sound. These analog input sensors all need a set point to work well with MilCandy.

Analog sensors compatible with MilCandy in the Grove product line include the sensors depicted in the picture below.
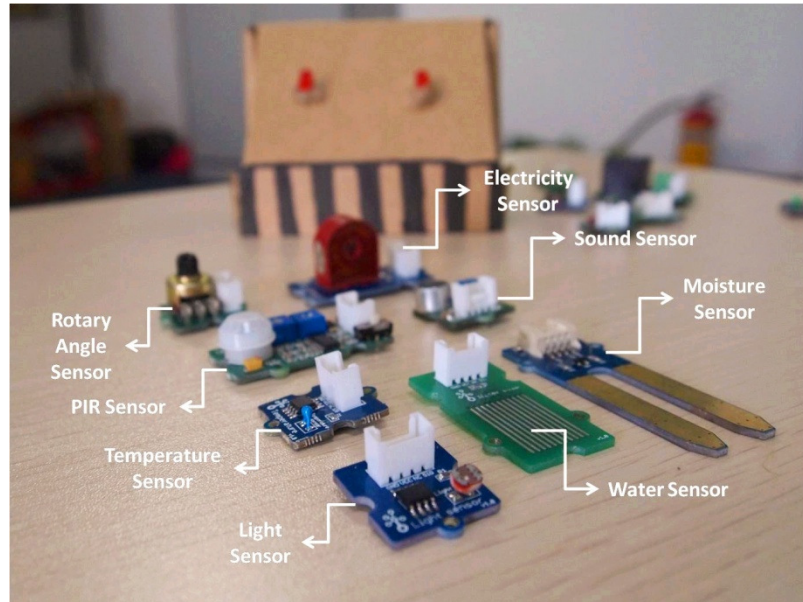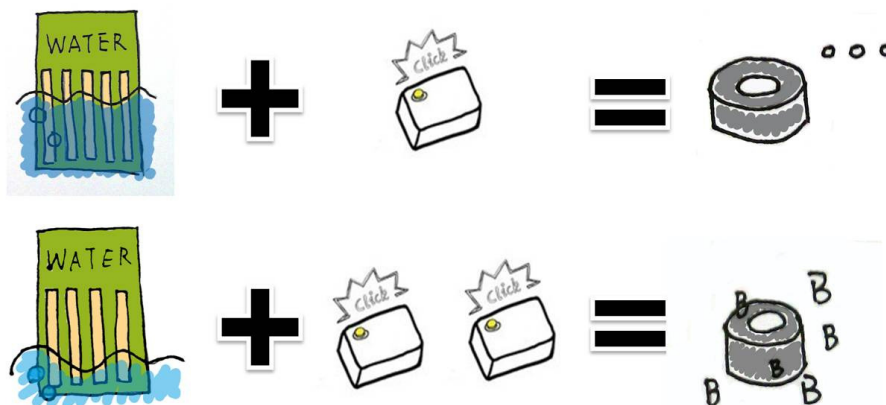

We've incorporated some of these sensors into fun mini projects. Read through and then try them out.

1、 Aquarium Water Level Sensor

Need a reminder for when your aquarium needs to be tapped off? This sensor will detect the water level and notify you with a beep when it's time to refill it.
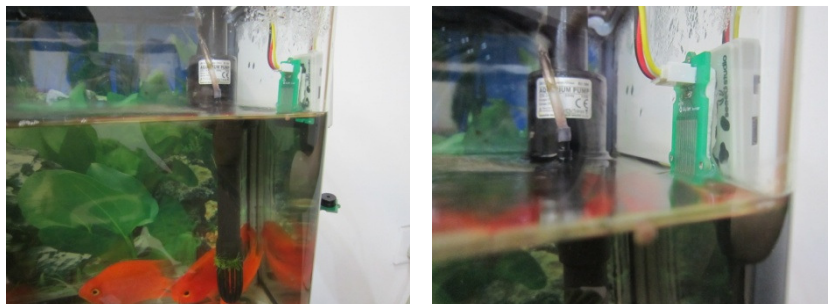
INPUT: Grove – Water Sensor

OUTPUT: Grove - Buzzer

In our first example above, submerge the sensor and single click the yellow "set" button on MilCandy to tell the buzzer to remain silent.

In the second example, submerge the sensor to the point where you would like the buzzer to activate, the set point, and double click the yellow "set" button. This will tell the buzzer to activate.

It's critical to double click at the set point, or you will lose some precision. After setting the logic, just sit back and relax.
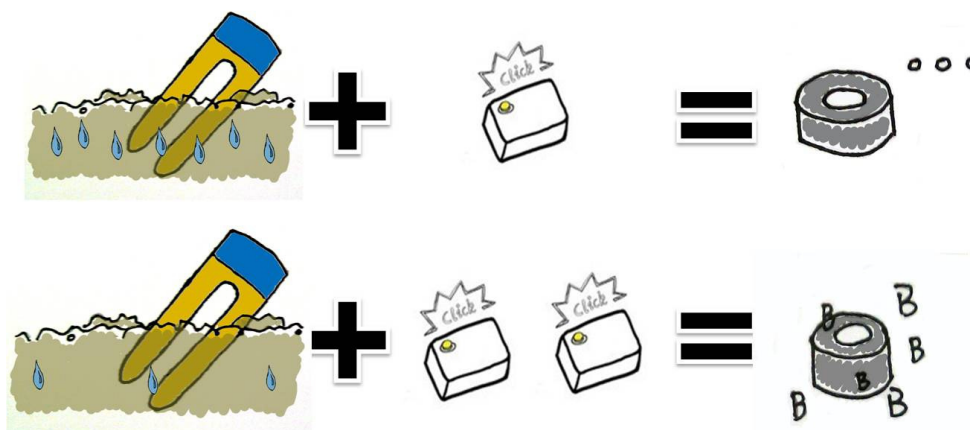

2、 **Bonsai Soil Moisture Monitor**

Do you have a friend who has the dreaded black thumb? A little gift to help him/her keep his/her bonsai healthy and alive will be perfect. When the soil moisture falls to the critical level, the buzzer will shout for the plant, "WATER!"
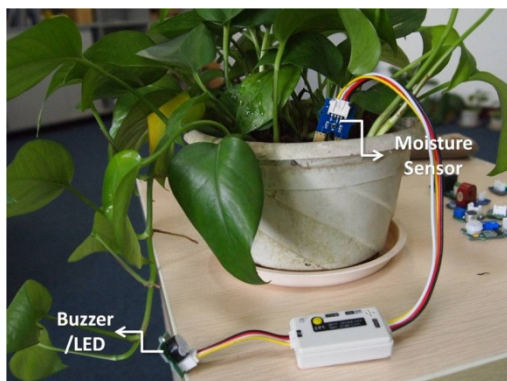
INPUT: Moisture Sensor

OUTPUT: Buzzer or LED

In our first example above, submerge the sensor in moist soil and single click the yellow "set" button on MilCandy to tell the buzzer to remain silent.

In the second example, submerge the sensor in dry soil and double click the yellow "set" button. This will tell the buzzer to activate.

Relay Switch

The relay switch is a fabulous module because you can control 120V and 220V high powered devices (essentially any device that plugs into an electrical wall outlet) with a low voltage gadget. That's useful!

Paired up with MilCandy, the relay can magnify MilCandy's control ability.
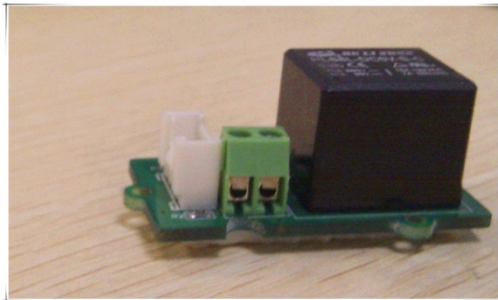
The following picture illustrates how the relay switch helps MilCandy control another circuit.
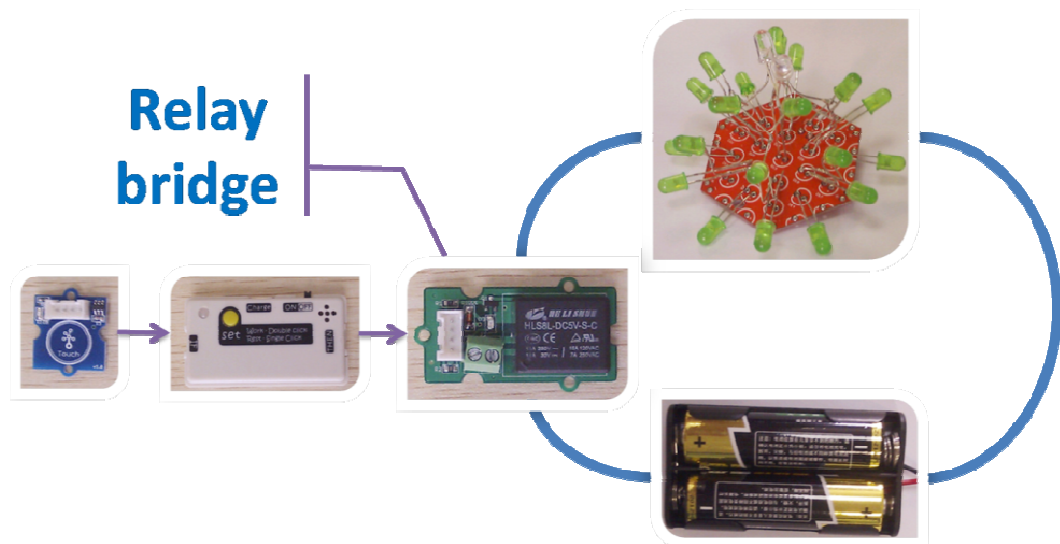
Signals from the input sensor are passed down to the relay through MilCandy. Once the relay receives the message, it translates it into either connected or disconnected in the second circuit.

Now, let's use a real world scenario to see how MilCandy and the relay switch work together. We've gathered black acrylic, hot glue, a PIR motion sensor, MilCandy, the Grove – Relay module, EL wire, and an EL wire inverter. This goal of this project is to illuminate the EL wire when the PIR motion sensor senses someone walking by.

INPUT: PIR Motion Sensor

OUTPUT: Grove - Relay + EL wire + EL inverter

Assembly steps：
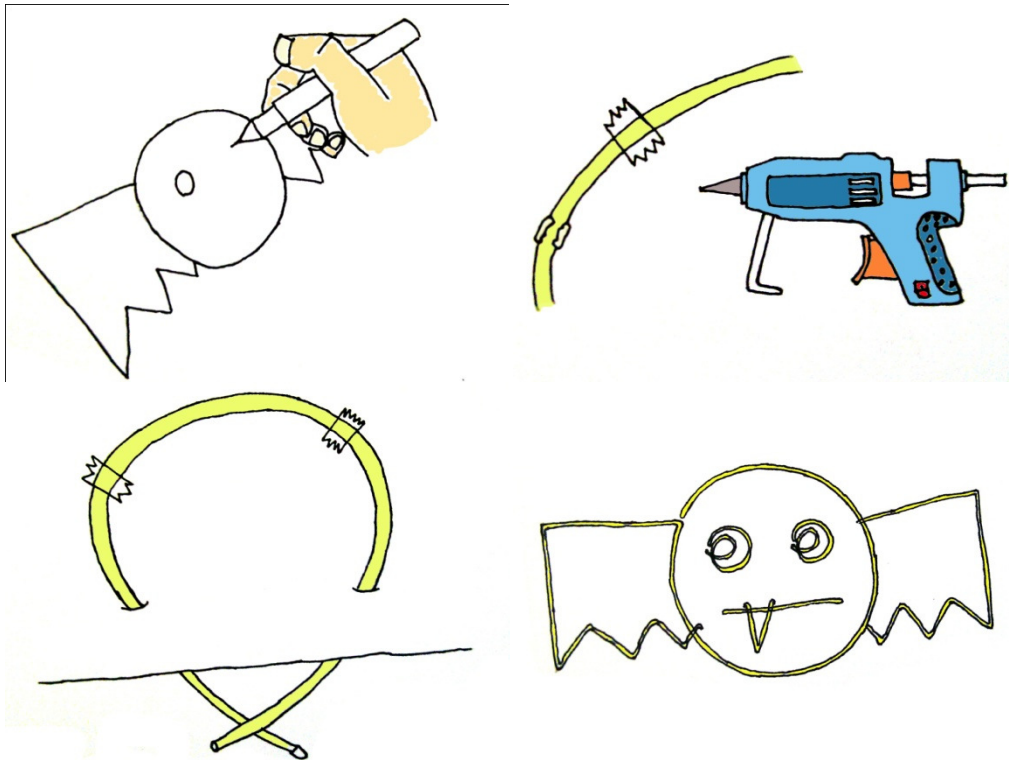
Sketch a drawing on black acrylic. Outline it with EL wire; you can use adhesive tape or hot glue to adhere it to the acrylic. If you don't want some sections of the wire to mar your sketch, hide them behind the acrylic board through holes.

Now, let's flip over the acrylic and to set up the controls. As you can see the unused EL wire is visible on the back side of the board. Connect the PIR motion sensor to MilCandy. (Keep in mind that the motion sensor will not be attached to the back of the acrylic. It can be attached to the front or placed in a location that gets a lot of foot traffic.) Connect MilCandy to the Relay. Attach the inverter and the EL wire to each other and insert the relay into the circuit by attaching the controlling wires.
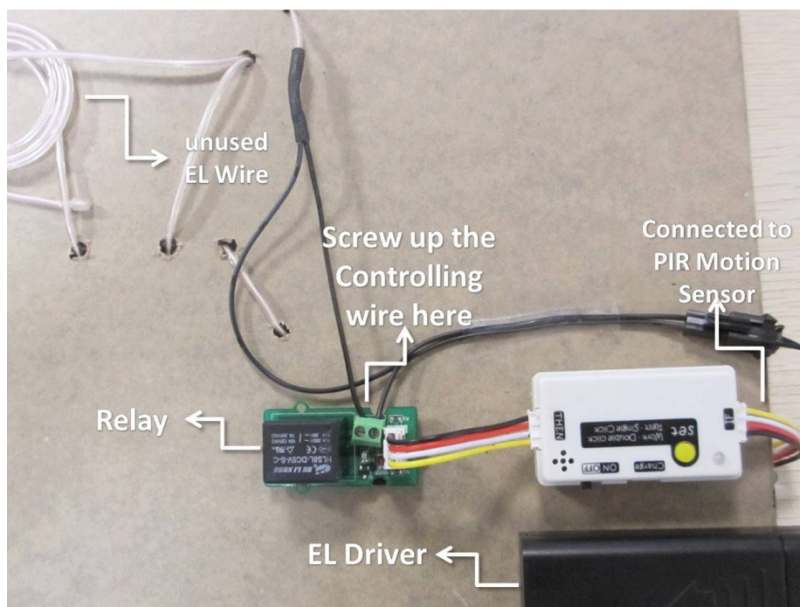
Now it's time to set the logic for MilCandy. When the motion sensor is not activated, click the yellow "set" button on MilCandy. As a person walks by the motion sensor, double click the yellow "set" button on MilCandy to activate the EL wire image.
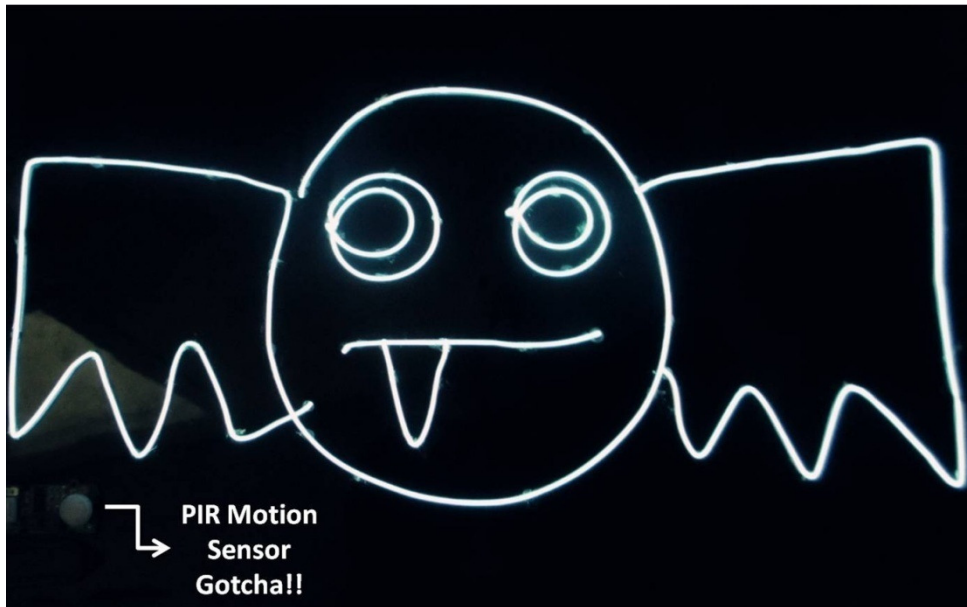
Note: This applications guide is written by Lit Liao and belongs to Seeed Studio. Special thanks to Jez Dean for his constructive suggestions that helped us improve the guide.